SYSTEM AND METHOD FOR PERFORMING AN ACTION ON A STRUCTURE IN COMPUTER-GENERATED DATA

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to manipulation of structures in computer data. More particularly, the invention relates to a system and method for performing computer-based actions on structures identified in computer data.

2. Description of the Background Art

Much data that appears in a computer user's day-to-day activities contains recognizable structures that have semantic significance such as phone numbers, e-mail addresses, post-office addresses, zip codes and dates. In a typical day, for example, a user may receive extensive files from word-processing programs and e-mail that contain several of these structures. However, visually searching data files or documents to find these structures is laborious and cognitively disruptive, especially if the document is lengthy and hard to follow. Furthermore, missing a structure such as a date may lead to missing an important meeting or missing a deadline.

To help facilitate searching a document for these structures, programmers can create or employ pattern analysis units, such as parsers, to automatically identify the structures. For the purposes of the present description, the term "pattern" refers to data, such as a grammar, regular expression, string, etc., used by a pattern analysis unit to recognize information in a document, such as dates, addresses, phone numbers, names, etc. The term "structure" refers to an instantiation of a pattern in the document. That is, a "date" pattern will recognize the structure "Oct. 31, 1995." The application of a pattern to a document is termed "parsing."

Conventional systems that identify structures in computer data do not enable automatic performance of an action on an identified structure. For example, if a long e-mail message is sent to a user, the user may implement a pattern analysis unit to search for particular structures, such as telephone numbers. Upon identification of a structure, the user may want to perform an action on the structure, such as moving the number to an electronic telephone book. This usually involves cutting the structure from the e-mail message, locating and opening the electronic telephone book application program, pasting the structure into the appropriate field, and closing the application program. However, despite the fact that computer systems are getting faster and more efficient, this procedure is still tedious and cognitively disruptive.

One type of system that has addressed this problem involves detecting telephone numbers. Such systems enable a user to select a telephone number and request that the application automatically dial the number. However, these systems do not recognize the selected data as a telephone number, and they generally produce an error message if the user selects invalid characters as a phone number. Also, they do not enable the performance of other candidate actions, such as moving the number to an electronic telephone book. That is, if a user wishes to perform a different action on an identified telephone number, such as storing the number in an address book, the user cannot automatically perform the action but must select and transfer the number to the appropriate data base as described above.

Therefore, a system is needed that identifies structures, associates candidate actions to the structures, enables selection of an action and automatically performs the selected action on the structure.

SUMMARY OF THE INVENTION

The present invention overcomes the limitations and deficiencies of previous systems with a system that identifies structures in computer data, associates candidate actions with each detected structure, enables the selection of an action, and automatically performs the selected action on the identified structure. It will be appreciated that the system may operate on recognizable patterns for text, pictures, tables, graphs, voice, etc. So long as a pattern is recognizable, the system will operate on it. The present invention has significant advantages over previous systems, in that the present system may incorporate an open-ended number and type of recognizable patterns, an open-ended number and type of pattern analysis units, and further that the system may enable an open-ended number and type (i.e. scripts, macros, code fragments, etc.) of candidate actions to associate with, and thus perform, on each identified structure.

The present invention provides a computer system with a central processing unit (CPU), input/output (I/O) means, and a memory that includes a program to identify structures in a document and perform selected computer-based actions on the identified structures. The program includes program subroutines that include an analyzer server, an application program interface, a user interface and an action processor. The analyzer server receives data from a document having recognizable structures, and uses patterns to detect the structures. Upon detection of a structure, the analyzer server links actions to the detected structure. Each action is a computer subroutine that causes the CPU to perform a sequence of operations on the particular structure to which it is linked. An action may specify opening another application, loading the identified structure into an appropriate field, and closing the application. An action may further include internal actions, such as storing phone numbers in an electronic phone book, addresses in an electronic address book, appointments on an electronic calendar, and external actions such as returning phone calls, drafting letters, sending facsimile copies and e-mail, and the like.

Since the program may be executed during the run-time of another program, i.e. the application which presents the document, such as Microsoft Word, an application program interface provides mechanisms for interprogram communications. The application program interface retrieves and transmits relevant information from the other program to the user interface for identifying, presenting and enabling selection of detected structures. Upon selection of a detected structure, the user interface presents and enables selection of candidate actions. When a candidate action is selected, the action processor performs the selected action on the selected structure.

In addition to the computer system, the present invention also provides methods for performing actions on identified structures in a document. In this method, the document is analyzed using a pattern to identify corresponding structures. Identified structures are stored in memory and presented to the user for selection. Upon selection of an identified structure, a menu of candidate actions is presented, each of which may be selected and performed on the selected structure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a computer system having a program stored in RAM, in accordance with the present invention.